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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,623	04/15/2004	Mark F. Bocko	000687-00335	6259

27557 7590 07/13/2005

BLANK ROME LLP
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WASHINGTON, DC 20037

EXAMINER

LAM, TUAN THIEU

ART UNIT	PAPER NUMBER
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2816

DATE MAILED: 07/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/824,623

Applicant(s)

BOCKO ET AL.

Examiner

Tuan T. Lam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 02 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to:
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/2/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-12 are rejected under 35 U.S.C. 102(b) as being anticipated by “A 160-Mhz Fourth-Order Double-Sampled SC Bandpass Sigma-Delta Modulator” of Bazarjani et al, attached to this Office action.

Figure 10 shows an integrator comprising an operational amplifier (the first amplifier on the left), a first chopper stabilization modulator (input modulator), second chopper stabilization (output modulator), a plurality of feedback loops (feedback paths), an input circuit (input circuit) for receiving a reference voltage (V_{rn1} , V_{rp1}) and input voltage (V_{ip} , V_{in}) and for supplying the reference voltage and the input voltage in alternation to the input ports of the operational amplifier while bypassing the first chopper stabilization modulator, and an output circuit (output circuit) for receiving an output voltage from the output ports of the operational amplifier while bypassing the second chopper stabilization modulator as called for in claims 1 and 10.

Regarding claims 2 and 5, the first and second switches are shown in the input circuit.

Regarding claims 3-4 and 6, the third switches are shown in the output circuit.

Regarding claim 7, the first and second stabilization modulators is inherently operating at one half of the sampling frequency to create a mirrored integrator.

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Regarding claim 8, the first and second stabilization modulators is capable of operating at a random alternating sequence with chosen spectral characteristics to create a spread spectrum integrator.

Regarding claim 9, the first and second stabilization modulators is capable of operating at a random alternating sequence with deficiency of low frequency spectral power to create a blue noise integrator.

Regarding claim 11, figure 10 shows a plurality of input circuits connected in parallel to the input ports of the operational amplifier.

Regarding claim 12, the plurality of input circuit have different sampling capacitance because they are configured in a complementary fashion.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In this regard, applicant's cited prior art has been carefully considered.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan T. Lam whose telephone number is 571-272-1744. The examiner can normally be reached on Monday to Friday (7:30 am to 6:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, TIMOTHY P. CALLAHAN can be reached on 571-272-1740. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Tuan T. Lam', with a long horizontal stroke extending to the right.

Tuan T. Lam
Primary Examiner
Art Unit 2816

6/24/2005

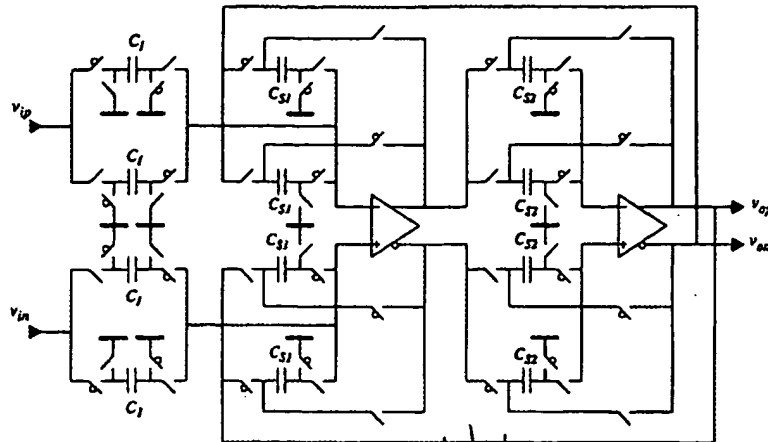


Fig. 9. SC resonator using two delay cells.

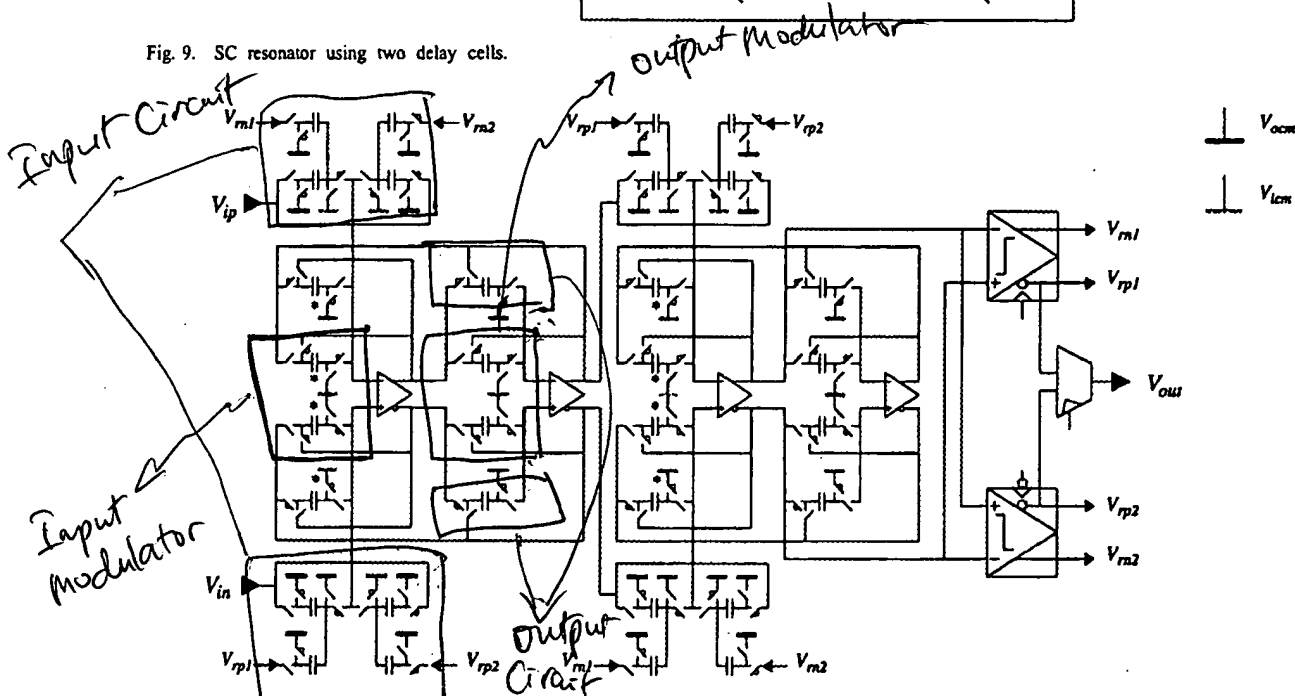


Fig. 10. A double-sampled SC fourth-order bandpass sigma-delta modulator.

two double-sampled resonators and a quantizer in a feedback loop, as shown in Fig. 10.

All the capacitors are unit size capacitors (C_u), except for the eight marked by asterisks which have a value of $2C_u$ and are made of two unit size capacitors in parallel. The gain of resonators is set by these eight capacitors to the required value of 0.5.

The functionality of this double-sampled SC bandpass $\Sigma\Delta$ modulator was verified in Eldo using near ideal components. The on-resistance of the switches was set to 200 Ω and the dc gain of opamps was assumed to be 60 dB. Fig. 11 shows the output spectrum of the modulator for a sinusoidal input signal at 40.08 MHz. The amplitude of the signal was 12 dB below full scale (DAC reference voltage) and the clock frequency was 80 MHz.

Simulated SNR is about 106 and 63 dB for bandwidths of 200 kHz and 1.25 MHz, respectively. For the same clock

frequency and signal bandwidth, the oversampling ratio of this modulator is twice as large as the single-sampled modulator. Thus, the SNR of this modulator is 15 dB higher than that of a single-sampled counterpart.

III. MISMATCH ANALYSIS IN THE DOUBLE-SAMPLED SC MODULATOR

A major limitation of double-sampled SC circuits is due to mismatch in the two paths [6] that causes an in-band image of the signal as described here. A diagram of a two-path circuit and its corresponding clock phases is shown in Fig. 12.

The nonoverlapping clock has a frequency of f_{clock} and the effective sampling frequency (f_s) of a double-sampled SC circuit is $f_s = 2f_{\text{clock}}$. The sequence of the signals during ϕ_1 (odd samples) is denoted by an "o" superscript and the sequence of the signals during ϕ_2 (even samples) is denoted by an "e" superscript. The odd and even sequences have a